

PATENT SPECIFICATION

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(54) JOINING SEALING STRIPS

(71) We, ETABLISSEMENTS MESNEL, a Societe Anonyme organised and existing under the laws of France, of 9 et 11, rue de la Riviere, 78420 Carrières-sur-Seine, France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

10 This invention relates to the formation of angled joints between lengths of sealing strips for use in vehicles.

An object of the present invention is to simplify and to render more economic the assembly of such angled joints between lengths of composite sealing strip which each comprise a sealing portion and a mounting portion.

Sealing strips are known more especially for vehicle doors, of the composite type, having a U-section extruded mounting portion of plastics material provided with a central metallic core, to which is adhered a sealing portion, which may be tubular or lip-shaped, also extruded but made of cellular material, which makes it possible to effect sealing over the entire periphery of a door, combined with a self-fixing of the aforesaid mounting portion on a flange of an internal fillister of the frame of the door.

However, in order to cause such joints to fit the shape of the bodywork — generally comprising a right angle — which corresponds usually to an upper part, of the door, it is necessary to adapt the said joint, by a corresponding somewhat onerous preparation, because of the fact that it is realised in two successive operations, after a not inconsiderable degree of prior preparation of each of the portions of the strips.

The present invention provides a method of joining together two lengths of sealing strip, each length comprising a U-section mounting portion of plastics material and a cellular resilient sealing portion of vulcanisable material, comprising forming oblique cuts on the ends of the lengths to be joined, enclosing these ends in register and in contact in a mould, applying heat to one part of the mould to raise the temperature thereof

and the temperature of the ends of the sealing portions of the lengths sufficiently to unite them by means of a vulcanisable solution previously applied thereto, whilst cooling a second portion of the mould, and enclosing the mounting portions of the lengths to maintain them at a temperature below their melting point and injecting plastics material complementary to the material of the mounting portions, to fill a mould cavity at and surrounding the joint between the mounting portions to form a fillet which securely unites the mounting portions.

The invention is applicable to sealing strip which has a mounting portion of a non-cellular vulcanisable elastomer and a sealing portion of a cellular vulcanisable elastomer, as well as to sealing strip which has a non vulcanisable mounting portion.

The invention will be described further, by way of example, with reference to the accompanying drawing, in which:

Fig. 1 is a perspective view of an angle joint effected in the usual and previously known manner, between two portions of an automobile bodywork sealing strip of the type contemplated by the invention;

Fig. 2 is a perspective view of an angle joint, between two portions of a sealing strip but improved in accordance with the invention;

Fig. 3 is a perspective view of a channel-shaped mounting portion of the sealing strip of Fig. 2, where a metallic frame thereof has been shown in dotted lines;

Fig. 4 is a schematic section of a mould, suitable for effecting in a single operation the improved angle joint of Fig. 2;

Fig. 5 is a schematic plan view of the two sealing strip portions of mounted "an 90 cheval" on an insert of the mould of Fig. 4, an upper portion of which is assumed to be withdrawn;

Fig. 6 is a schematic perspective view of a so-called carousel or machine, making possible the progression of numerous successive moulds, each of the type of Fig. 4, past a moulding head, so as to increase to that extent the rate of production, and to match at the same time the short duration 100

of the injection with the much longer time necessary for the vulcanisation of a solution interposed between the mitre cuts of the cellular sealing portions; and

- 5 Fig. 7 is a schematic view of a rapid clamping device for a mould having a single or multiple impression, on a turret machine plate for example.

10 In Fig. 1, which shows a customary angle assembly, two portions of bodywork sealing strip are joined in a known manner, in two successive operations, after prior preparation by mitre cuts 1 and 2, both on the U-shaped mounting portion 3 extruded, usually 15 from PVC, about a central metallic core and on a tubular sealing portion 4, extruded from cellular elastomer. The two portions are adhered together.

20 After this preparation, completed by a rather difficult and laborious stripping of the portions from the internal metallic core of the portion 3, uncovered by the aforesaid mitre cuts and which otherwise would form abutments preventing the build-up of an 25 extra-thickness of plastics material which is necessary, of the order of 2 millimetres, to realise the weld 5, this first weld is effected in a known manner, by interposing suitable heating plates between the mitre cuts 1 and 30 2, so as to bring them into their fusion temperature and then bringing them rapidly together in order to effect union.

35 Then, in a second operation, after coating of the mitre cuts of the other portion 4, generally made of cellular elastomer, with vulcanisable solution, one places in the usual manner the pieces of sealing strip joint prepared in this way into a mould having a 40 suitable shape and heated to a temperature of the order of 160°C, which effects the vulcanisation of this angle assembly over several minutes.

45 On the other hand, in accordance with Fig. 2 and in accordance with the invention, the same type of angle assembly of two pieces of sealing strip is effected, on the one hand, much more economically in a single operation and on the other hand in a very strong way, in that the internal metallic 50 frame no longer needs to be cut-out and a gusset 6 of extra thickness effected upon the injection of thermoplastic resin, considerably reinforces the weld effected in this way in this angle joint.

55 To perform the above method we use an original and improved mould, in accordance with Fig. 4, in which an upper part 7 is adapted to allow there an injection of "non-reactive" polyurethane thermoplastic resin, 60 in the zone of the angle of the reinforced mounting portion 3, while the lower part 8 of the mould is adapted to make it possible to effect there, at the same time the usual vulcanisation of a solution at the mitre joint 65 in the cellular sealing portion 4.

To be more precise, this upper part 7 of the mould comprises, in addition to the cavity part 9 adapted to receive the two mounting portions of strip, a supplementary 70 cavity 10, meeting a constricted and cranked supply channel, intended to fit onto the injection nozzle 12 of a conventional machine. The upper part 7 of the mould comprises furthermore a cooling duct or 75 ducts 13, for water for example, to limit the temperature of this part of the mould to about 40°C.

80 On the other hand, the lower part 8 of the mould is made so as to comprise the cavity part 14, complementary with the aforesaid cavity 9 of the upper part 7 of the mould, in order to contain together and at one and the same time the end parts of the sealing portions of the lengths of strip to 85 be joined. A thermally insulating member 15, is disposed between the parts 7 and 8 of the mould, to limit the heat exchange between these elements whose temperature is very different, the lower part 8 of the 90 mould being heated to a temperature of the order of 160°C, by electrical resistances such as 17.

95 With the mould described it is possible to join the sealing and mounting portions of two lengths of sealing strip at the same time, by injecting polyurethane thermoplastic resin, at a temperature of the order of 250°C 100 through the nozzle 12 to fill cavities 9 and 10, whilst simultaneously effecting the vulcanisation of a solution coated on the mitre cuts of the portions 4 in the heated 105 mould 8. The cooling of the upper mould part prevents heat from the lower mould part re-melting the plastics material during the several minutes which are necessary for vulcanisation.

To compensate for this discordance of duration of cycles of these two conjoint operations and on the other hand to increase productivity, it is possible to use a so-called 110 "turret" device (Fig. 6) in which any number of moulds, such as 18 entrained by a rotary plate 19, can be progressed beneath an injection device having also multiple nozzles, such as 20, appropriate to the number of 115 moulds, while their speed of progression will be regulated, so that one complete revolution of the plate 19 corresponds to the vulcanisation time of the solution.

120 Fig. 7 shows, schematically, a device for rapid clamping of the successive moulds, actuated for example by jacks, which can facilitate the increase in productivity thus aimed at.

125 As a variation it is possible to substitute a polyester for the polyurethane.

A joint made in accordance with the invention, therefore, has a much greater rigidity than known joints, since the injected material has a final hardness ensuring an 130

important reinforcement.

This rigidity is extremely useful in an automobile bodywork, where the angle zone often covers material clothing the inner part of the vehicle and which, mounted under slight tension, tend to fold back or pull down the end of the angle and to create defects of aesthetics and risks of tear-off which are usual with the previous and traditional solution.

The invention, realises new industrial products, characterised by a conformation well suited to the bodyworks of automobiles, with a more aesthetic presentation, a better elasticity and an improved tightness, while being of a simpler and more economical realisation, while allowing moreover a considerable increase in productivity.

Finally, it is evident that the invention is in no way restricted only to the sole exemplified embodiments explicitly described or merely evoked above, but that, on the contrary, its scope extends expressly not only to the variants implementing one means or method of one of the combinations described with those of another, but also to all the other variants of execution or of applications and especially to these implementing means and methods which are equivalent or merely comparable, more especially by inversion or transposition of the dispositions described or shown.

In this respect, it is here specified that thus and for example the scope of the invention extends to these cases where the mounting portion comprises an aesthetic covering, of fabric since experience has shown that, contrary to what one could fear and with or without special preparation of the ends of lengths of strip to be joined, the rapidity of the cooling of the assembly injection is such that there is no impairment of the afore said coverings.

WHAT WE CLAIM IS:

1. A method of joining together two lengths of sealing strip, each length comprising a U-section mounting portion of plastics material and a cellular resilient sealing portion of vulcanisable material, comprising forming oblique cuts on the ends of the lengths to be joined, enclosing these ends in register and in contact in a mould, applying heat to one part of the mould to raise the temperature thereof and the temperature of the ends of the sealing portions of the lengths sufficiently to unite them by means of a vulcanisable solution previously applied thereto, whilst cooling a second portion of the mould, and enclosing the mounting portions of the lengths to maintain them at a temperature below their

melting point and injecting plastics material complementary to the material of the mounting portions, to fill a mould cavity at and surrounding the joint between the mounting portions to form a fillet which securely unites the mounting portions.

2. A method as claimed in claim 1, wherein the resin injected is a non-reactive polyurethane thermoplastic resin, at a temperature of the order of 250°C and compatible with the material of the mounting portion while in the same mould vulcanisation is effected of an elastomer solution, previously interposed on the mitre cuts of the sealing portion.

3. A method as claimed in claim 1, wherein the resin injected is a polyester resin compatible with the material of the mounting portion and there is effected in the same mould the vulcanisation of an elastomer solution, previously interposed on the mitre cuts of the sealing portion.

4. A method as claimed in claim 1, wherein the mounting portion is of a non-cellular elastomer and the sealing portion of a cellular form of the same elastomer.

5. A method of joining two lengths of sealing strip substantially as hereinbefore described with reference to and as illustrated in Figs. 2 to 7 of the accompanying drawings.

6. Moulding apparatus when used to carry out the method of any preceding claim and comprising a mould assembly comprising a plurality of mould parts defining two moulding cavities, each shaped to receive respective end portions of the sealing or mounting strips, means for heating one of the mould cavities whilst maintaining the other at a lower temperature, and means for injecting synthetic resin into the other cavity.

7. Apparatus as claimed in claim 6, wherein the other mould cavity has a portion which forms a reinforcing gusset upon injection of synthetic resin.

8. Apparatus as claimed in claim 6 or 7 when the mould assembly is one of a plurality of such assemblies in a turret moulding machine.

9. Moulding apparatus as claimed in claim 6 substantially as hereinbefore described with reference to and as illustrated in the accompanying drawings.

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and

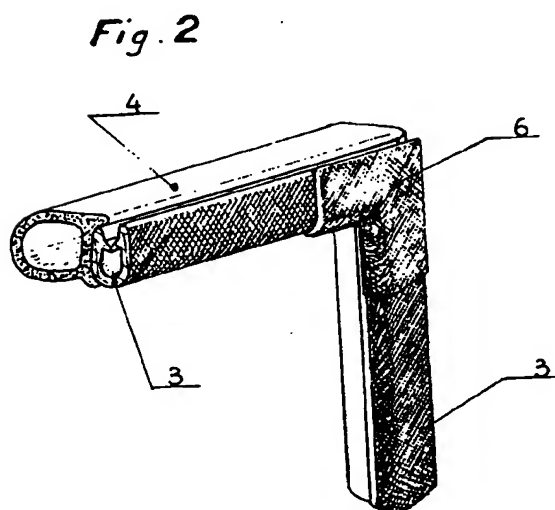
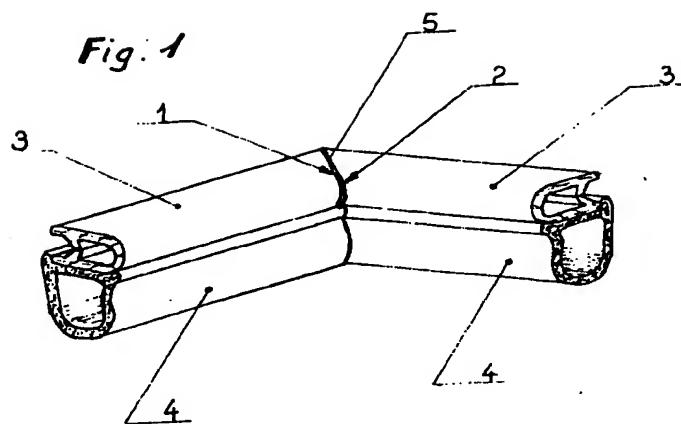
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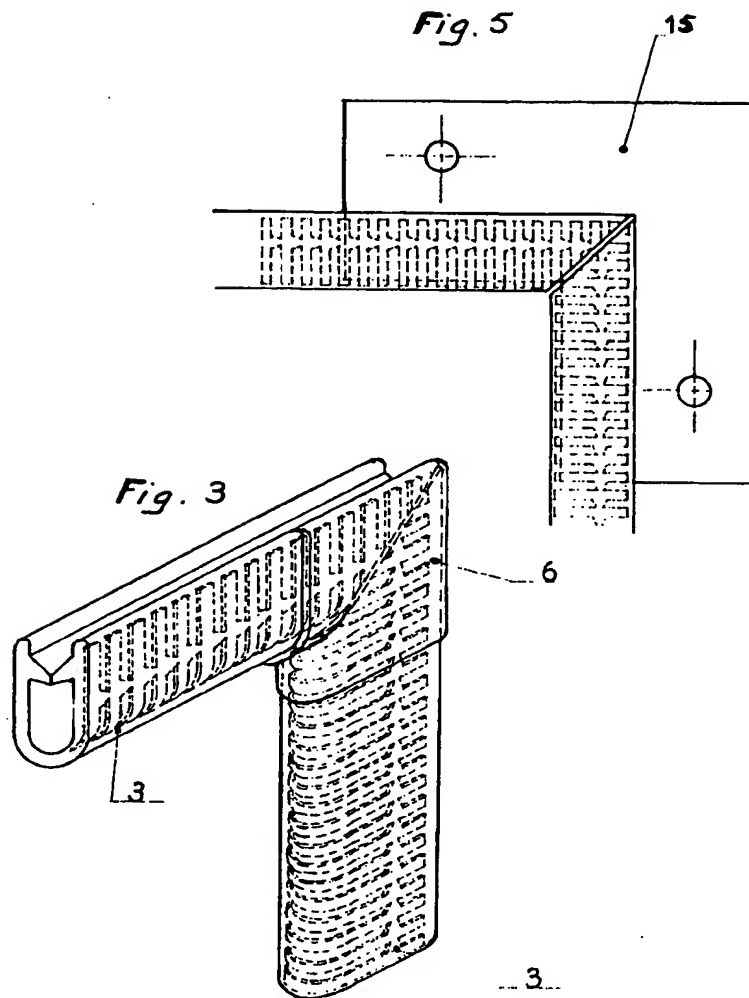
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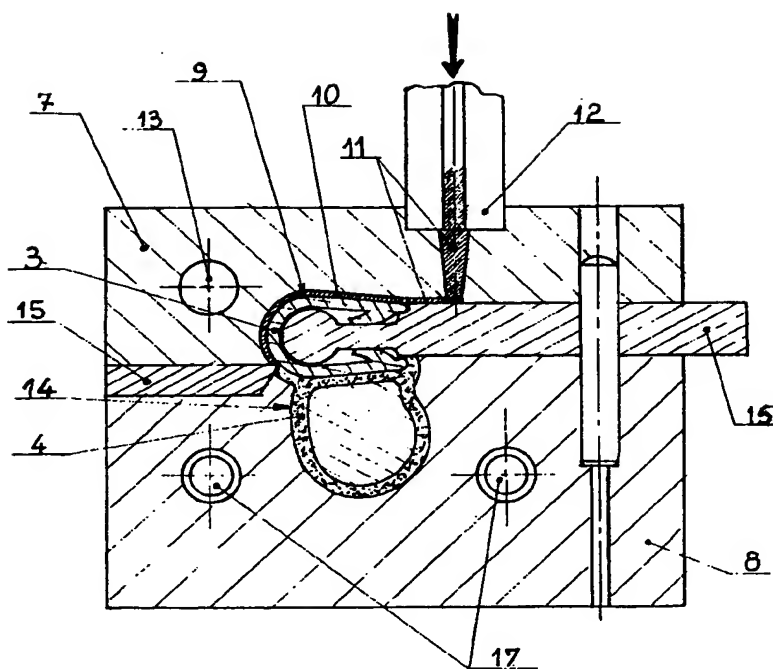


Fig 4

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Fig. 6

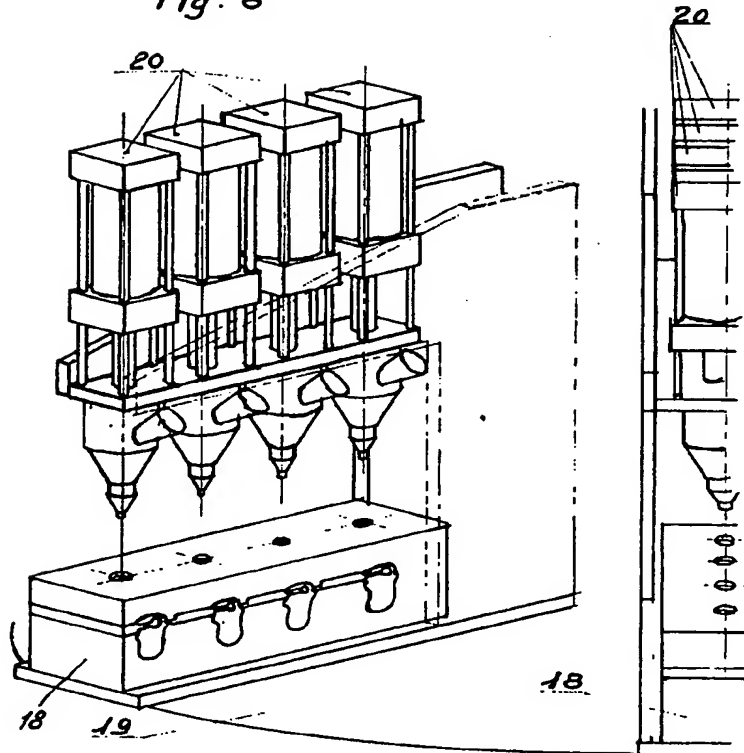
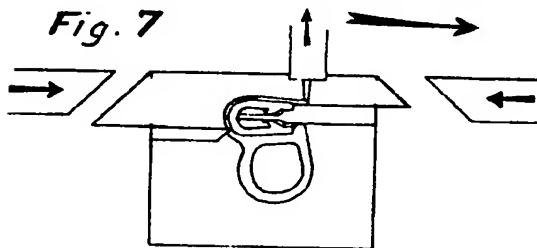


Fig. 7



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